



## RESEARCH ARTICLE

### Assessment of Socio-Economic Factors Influencing Adoption of Agricultural Innovation by Farmers in Kaduna State

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#### ABSTRACT

This study investigated those factors which influenced the adoption of agricultural innovation by the farmers in Kaduna state Nigeria. Data were collected with the aid of structured questionnaire from 30 respondents. The data were analysed using descriptive statistics and logit regression model. Adoption of technology was found to be higher among the large household than the small-sized household. This may be due to the fact that farmers with large household have many families to care for. About 90% of the respondents were married men while 10% were single. This shows the farming as that of settled minds and that it contributes to household economic stability in one way or the other. Most of the respondents (43.3%) had Arabic education, 26.7% had secondary education, 13.3% had primary education, 10% had tertiary education, while 6.7% had no formal education. 95% of them are literates and had one form of education or the other. Also, 70% of the respondents adopted innovation, while 26.6% did not adopt the improved innovation. Therefore, the Socio-economic factors influencing adoption of innovation were age, education, extension contact and membership of cooperative. The study therefore recommends that farmers should form themselves into association because such association will aid in collective soliciting for assistance from government, Non Governmental Organisations and other funding agencies. Also, more awareness should be created by the extension agents on the importance of research work.

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## INTRODUCTION

Rogers (1995) defined adoption as the decision to make full use of an innovation or technology as the best course of action available. Adoption of a new agricultural innovation or practice requires that the farm operator must be aware of the practice, becomes interested in it, evaluate it, try it out, and then take steps of adoption. Ganpat and Seepersad (1996) indicated that for a successful adoption of a technology, farm operators must not only know about it, but must be able to follow the recommendations given. Agriculture constitutes one of the most important sectors of Nigeria's economy. The sector is particularly important in terms of generating employment and contributing to gross domestic product (GDP) and export revenue earnings (Manyong *et al.*, 2004). In Nigeria, an estimated 65% of the population resides in the rural areas where agriculture is the predominant occupation. It is estimated that about 70% of the rural population are engaged in agriculture

(Federal Office of Statistics, 1999). Generally, the agricultural sector is the single largest sector of the economy, contributing about 41% to the country's gross domestic product. It also contributes significantly to national employment, with about 60% of the country's total workforce engaged in agriculture. The sector accounts for most of the country's food supply and it is also an important contributor to the nation's foreign exchange earnings as well as the supply of industrial raw materials (Olayemi *et al.*, 2004).

Although the use of animal power for land cultivation has been adapted to a limited extent in the savannah/Sahel belt of the country, its use in other areas is almost nonexistent, for ecological and cultural reasons. Mechanization of agriculture in the country has generally made little headway due to technical, ecological, and socioeconomic factors (Olayemi *et al.*, 2004).

Performance of Nigeria's agriculture is low because the nation is underutilizing its agricultural potential (Ruhl, 2011). The sector employed about two-thirds of Nigeria's

labour force and contributed 42% to the country's gross domestic product, yet its productivity is still below average. Productivity has not grown sufficiently due to under-investment in new technology, slow adoption of existing improved technologies, constraints associated with the investment climates and lagging infrastructure. Agriculture remains the main source of growth and an important option for the country in its quest for diversification to non-oil source of growth. The development of commercial agriculture would provide opportunity to increase employment and reduce rural poverty (Ruhl, 2011). Diversification into commercial agriculture is important for making growth sustainable, to diffuse its benefit to rural areas and to hedge against shocks from a single resource dependence on oil (Ruhl, 2011).

Knowledge from numerous sources (comprising all various actors and stakeholders) are integrated and effectively put into use. This approach to agricultural research is termed Integrated Agricultural Research for Development (IAR4D) and has been adopted by the Sub Sahara Africa Challenge Programme (Ayanwale *et al.*, 2009).

## MATERIALS AND METHODS

### Study area

The study was carried out in Bomo village, Sabon gari local government area, located between latitude 118 11° north and longitude 070 38° East at 675 meters. The hottest months are March-April, while the coldest months are December-January. Rainfall is heaviest in the south and decreases northwards with an annual mean rainfall varying between 942mm and 1000mm which last for six months (May-October) (NARERLS, 2002). Soil of the area is characterised by ferruginous tropical soils formed on drift material (Klinkenberg and Haggins, 1968). The surface soil is fine sandy loam, prone to capping and poor structure. Its physical structure has been described by Kowal (1972). In this area trees like sea butter, locust bean predominate, while in the north and northwest, Baobab, silk cotton and date palm are predominant. The people in this area engage in agricultural production activities. The main crops that are grown include maize, millet, rice, groundnut, yam and sugar cane.

Primary data were used for this study. These were collected with the aid of structured questionnaire. The data were collected from 30 respondents in the study area.

### Analytical techniques

**Descriptive statistics:** This was used to describe socio-economic characteristics of the farmers and level of adoption. It includes frequency count and percentages.

**Logit regression:** This was used to identify socio-economic and adoption factors. The probability of a respondent adopting the agricultural techniques is determined by an underlying response variable that captures the true socio-economic status of the respondents. The underlying response variable  $y^*$  in the case of binary choice is defined by the multivariate logit regression relation:

$$y^* = (-\sum X_i \beta_j) + \mu$$

Where:  $\beta_j = \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$ , and  $X_i = X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}$

The relevant logistic expressions are given as:

$$Prob(y^* = 1) = 1 - F * (\sum X_i \beta_j) = \frac{e^{-\sum X_i \beta_j}}{1 + e^{-\sum X_i \beta_j}}$$

$$Prob(y^* = 0) = F * (\sum X_i \beta_j) = \frac{e^{\sum X_i \beta_j}}{1 + e^{\sum X_i \beta_j}}$$

Where: F = The cumulative distribution function for  $\mu_1, \dots$

$$Prob(Y_i = \frac{0}{\beta_j} X_i) = F(-\sum X_i \beta_j),$$

$$Prob(Y_i = \frac{1}{\beta_j} X_i) = 1 - F(-\sum X_i \beta_j)$$

Where;

Y = adoption (1= adopter, 0= non-adopter )

$\mu_i$  = a logistic cumulative distribution in F

$X_i$  = characteristics of households

$X_1$  = Age

$X_2$  = Education (years of formal schooling)

$X_3$  = Household size (number of persons in the household)

$X_4$  = Amount of credit received (Naira)

$X_5$  = Membership of cooperative (years)

$X_6$  = Income (Naira)

$X_7$  = Extension contact (Number of contacts)

$\beta_i$  = The coefficients for the respective variables in the logit function

## RESULTS AND DISCUSSION

Results in Table 1 shows that farming activities are predominated by male; this may be due to religious belief, that men are more involved in agriculture than the women in the area. Table 1 further reveals household size between 12-17 has percentage of (36.7), this implies that household have positive significant role in farming activities. Therefore, adoption of technology is higher among the large household than the small-sized household. This may be due to the fact that farmers with large household have many families to care for. Ninety percent of the respondents were married men while 10% were single. This shows the business as that of settled minds and that it contributes to household economic stability in one way or the other, Amaechi (2000). Most of the respondents (43.3%) had Arabic education, 26.7% had secondary education, 13.3% had primary education, 10% had tertiary education, while 6.7% only had no formal education. 95% of them are literates and had one form of education or the other. Education may not prerequisite to enter into farming business, but their productivity could be enhanced by some level of educational attainment. Seventy three percent of the respondents adopted the innovation, while 26.6% did not adopt the technology. The reason for relatively greater adoption of the practice may be that, this innovation is by no means completely new to these farmers. Studies (Rogers, 1965; Lionberger,

**Table 1:** Socio-economic characteristics of farmers

Variables	Frequency	Percentage (%)
Gender		
Male	30	100
Female	0	0
Household size		
1-5	7	23.3
6-11	6	20.0
12-17	11	36.7
None	6	20.0
Marital status		
Married	27	90
Single	3	10
Educational level		
Primary	4	13.3
Secondary	8	26.7
Tertiary	3	10
Arabic	13	43.3
Other	2	6.7

**Table 2:** Adoption level of technology

Variables	Frequency	Percentage
Adopters	22	73.4
Non-adopters	8	26.6
Total	30	100

**Table 3:** Factors influencing adoption of agricultural techniques

Variable	Coefficient	Standard error	b/St.Er.
Age	0.063	0.028	2.25**
Education	0.432	0.142	3.04***
Household size	-0.251	0.523	-0.480
Amount of credit received	0.472	0.743	0.635
Membership of cooperative	0.573	0.149	3.846***
Income	0.015	0.063	0.238
Extension contact	0.171	0.023	7.434***

\*\*\* = P<0.01; \*\* = P<0.05; \* = P<0.10

1962) have also shown that are compatible with local practices are known to be acceptable to farmers.

### Adoption level of technology

One of the objectives of the study was to determine the extent to which farmers have adopted the technology. Table 2 showed that, 73.4 percent adopted the technology and 26.6 did not adopt the new technology. The reason for greater adoption of the technology is because; this practice is economic and environmental friendly to these farmers. Studies (Rogers, 1965; Lionberger, 1962)

### Adoption factor of farmer

Results presented in Table 3 showed the factors that influence the adoption of the agricultural techniques in the study area. It was revealed that four out of the seven variables included in the model were significant. These variables were age, education, extension contact and membership of cooperative. The table 1, indicated that 63.3% of the age of the adopters were between the range of 50-59, showing that as the farmers are growing older, the adoption of innovation increase positively and significantly influential to the adoption. This implied that as farmers' increases in age, the probability of adopting this method would also increase. The importance of age lies in its effect on the adoption of innovations and the processing of information. This is evident that there is a positive relationship between age and adoption behaviour of farmers. Older farmers are more likely to adopt

innovation than younger farmers. The coefficient obtained for education is positive and significant at 5 percent level. This implies that the higher the educational level, the more the probability that respondents would adopt this method and vice versa, this is because education enhances the level of understanding. Also, the more educated a farmer, the more the chances that he/she would utilize available opportunity and adopt innovation.

The coefficient obtained for extension contact was positive and significant at 1 percent. The implication of this is that if farmers have more contact with the extension agent. There is probability that adoption would increase. This implied that availability of extension services and information about the innovation as well as its utilization play important role in determining level of adoption. The coefficient (0.447) for membership of associations was positive and significant at 5% level of probability. Membership of association can provide means of interaction with other farmers and this can also provide avenue or forum through which innovation can be diffused among farmers. Membership of association affords the farmers the opportunity of sharing information on modern farming practices by interacting with other farmers.

### Conclusion

The result of this finding revealed that, organizing the farmers into association is an essential task as it makes the work easier. Also, such an association will aid in collective bargaining, soliciting government assistance, Non Governmental Organizations and other funding agencies. Also, adequate attention should be paid to farmers' socio-economic characteristics as these would be significant facilitators of adoption. Extension agents should be trained to understand the socio-economic characteristics of farmers which influence their level of adoption.

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